REGISTERED
Europäisches Patentamt

80298 München

Bremen, 12 August 2005

Our Ref.: IA 814-02WO STK/cds
Direct Dial: 0421/36 35 694

Applicant: INTERNATIONAL UNIVERSITY BREMEN
Serial Number: PCT/EP2004/011840

In response to the Written Opinion dated 1 March 2005

It is herewith forwarded:

- new claims 1 to 17 which shall – without prejudice – replace previous claims 1 to 17.

All independent claims have been amended consistently by inserting a definition that transmitting stations receiving a reservation indicator carrying a first reservation indicator value transmitted from a receiving station to which no data signal has been transmitted by them check this "*by use of the signal strength of the reservation indicator or by use of the path gain*". This amendment is based on the description on page 8, lines 13 to 25 and on page 18, lines 1 to 29. In particular, page 18, lines 2 to 15 and lines 20 to 22 make clear that besides the path gain also the

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signal strength of the reservation indicator can be used by a transmitting station to check if a received reservation indicator is from a receiving station to which it is transmitting data signals.

Further, it is now clarified that "said" reservation indicator is meant, for instance in line 8 of claim 1.

All amendments are visible from the attached marked-up copy of the new claims.

We respectfully disagree with the examiner's opinion that the subject matter of the invention does not involve an inventive step. The difference to the prior art has now been clearly emphasized by the amendments made in the new claims.

1. Comparison with D1

1.1 According to D1 a receiver sends (UNICAST) an indicator of unacceptable/acceptable interference to a transmitter. This indicator is not used by other transmitters to determine if they can use the shared channel or not. So there is no interference avoidance, but only interference detection.

1.2 According to the present invention a BS (base station) or MS (mobile station) receiver broadcasts an indicator to all transmitters (BSs and MSs) indicating

i) to the transmitter communicating with it acceptable / unacceptable interference and, simultaneously,

ii) to all other transmitters that are in range of the receiver their link-gains to the receiver. This information is used to determine how much interference they will contribute to the receiver, if they transmit and whether they can transmit or not, for instance by comparing this interference to a threshold. These transmitters decide whether or not to transmit based on the signal strength or the path gain, in particular base on whether their potential interference crosses the threshold. So there is both interference avoidance and interference detection.

When interference is unacceptable at the receiver this is indicated and a new channel is assigned for the communication.

2. Comparison with D2

The scheme proposed in D2 is not directly related to the present invention in itself, but the system proposed in D2 is directly relevant for the DCCH access protocol in IS-136.

2.1.1 It is essential to the DCCH access protocol (and therefore for the system of D2) that the indicator exchange takes place between a receiver and only those transmitters that communicate with it and not with transmitters that communicate with other receivers.

In addition, it is essential to the DCCH access protocol (and therefore for the system of D2) that a transmitter receives indicators from only the receiver it communicates with. If a transmitter, in addition to receiving an indicator from its own receiver, simultaneously receives an indicator from a receiver other than its own receiver, this indicator interferes with and corrupts its own indicator, leading to errors in the decoded indicator message and unexpected protocol behaviour. Therefore, the DCCH access protocol (and therefore the system of D2) is currently used with only the BS as the receiver and the MSs served by the said BS as the transmitters in a single cell set-up, where a high frequency re-use factor eliminates the possibility of interference from the indicators from neighbouring BS receivers (i.e., the IS-136 system).

The principle of this protocol already prevents it to be applied in the key application of the system according to the present invention, i.e. intercellular interference mitigation.

2.1.2 On the contrary, it is essential to the present invention that the indicator exchange take place between a receiver and those transmitters that communicate with it and also with transmitters that communicate with other receivers! Therefore, it is expected in the system of the invention that on occasion a transmitter will simultaneously receive indicators from the receiver it communi-

cates with and receivers it doesn't communicate with. If a transmitter, in addition to receiving an indicator from its own receiver, simultaneously receives an indicator from a receiver other than its own receiver this does not corrupt its own indicator, since it is the signal strength or the path gain (in general the measured energy) of the reservation indicator that is used according to the present invention to make a scheduling decision.

So, in a simple embodiment of the invention, additional indicators, in this case, simply raise the average detected energy level of the indicator, and is an accurate indication of the "degree of business" of the shared wireless medium, and if high enough forces the transmitter not to transmit, which is exactly the desired protocol behaviour under these conditions. The principle of this protocol enables it to be applied in the key application of the system according to the present invention, i.e. intercellular interference mitigation.

2.2.1 It is essential to the DCCH access protocol (and therefore for the system of D2) that the indicator exchange takes place between a BS receiver and only those transmitters that communicate with it which in a cellular system by definition is not a BS. Therefore, it is essential to the DCCH access protocol (and therefore for the system of D2) that for a high frequency-reuse application it is used in an FDD network, as IS-136, that eliminates BS to BS interference. The principle of this protocol prevents it to be applied in the key application of the system according to the present invention, i.e. intercellular interference mitigation in TDD.

2.2.2 On the contrary, it is required in according to the invention, in particular in a TDD application, that the indicator exchange can take place between a BS receiver and those transmitters that communicate with it and also with transmitters that communicate with other receivers, which in a cellular system are by definition includes other BS transmitters. Therefore, a high frequency-reuse application according to the present invention can operate in TDD and hybrid TDD/FDD networks, as proposed for 4G. The principle of the present invention enables it to be applied in intercellular interference mitigation in TDD.

2.3.1 The DCCH access protocol (and therefore the system of D2) uses an indicator, which must be decoded to indicate a busy and free channel. The information is contained within the bits of the received indicator.

2.3.2 In contrast, the invention uses an indicator comprising of broadcast energy to indicate busy and free channel. The information is in the energy of the received indicator.

2.4.1 The DCCH access protocol (and therefore the system of D2) broadcasts the indicator on a different frequency channel than the data (IS-136 uses FDD). Therefore, it cannot convey the required path gain information of the communication link on the data channel.

2.4.2 In contrast, the protocol used according to the invention broadcasts the indicator on the same frequency channel as the data (preferably, it uses TDD). Therefore, it conveys the required path gain information of the communication link on the data channel.

2.5.1 Finally, D2 is also solving a different problem which is (see page 8, second paragraph): "The present invention allows mobile stations, with small volumes of data transmissions to interrupt larger sized data transmission. In some cases, this invention reduces the backlog of pending stations and thereby increases network efficiency".

2.5.2 In contrast, the problem do be solved by the present invention is to provide a decentralised random access protocol which allocates data channels based on interferences caused to co-existing links and achieved signal-to-interference-plus-noise-ratio (SINR) at the intended station.

In conclusion, neither does a combination of the subject matter known from D1 and D2 lead to the subject matter of the present invention, since some features would still be missing, nor is such a combination obvious. In contrast, we are convinced that the present invention does involve an inventive step.

It would be much **appreciated** if the examiner, in case he can still – despite the above arguments – not yet acknowledge an inventive step or in case of other objections to be dealt with, issued a **second written opinion** before issuing the final preliminary report as to patentability.

(Stephan Keck)
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Encls.:
New claims 1-17